CENTRAL VALLEY
FLOOD MANAGEMENT
PLANNING PROGRAM

FloodSAFE
CALIFORNIA

2012 Central Valley Flood Protection Plan

Important Considerations for the Central Valley Flood Protection Plan Related to Sacramento-San Joaquin Valley Agriculture

DRAFT May 2010

STATE OF CALIFORNIA
THE NATURAL RESOURCES AGENCY
DEPARTMENT OF WATER RESOURCES

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1.0 Introduction

1.1 Background and Purpose

As part of the development of the Regional Conditions Report (RCR) for the 2012 Central Valley Flood Protection Plan (CVFPP), the California Department of Water Resources formed and facilitated a series of regional and topic work groups composed of partners and interested parties to assist in the CVFPP development process. These work groups identified the need for an agricultural subcommittee to further define and prioritize major agricultural challenges to be considered during development of the 2012 CVFPP and considered in future plan revisions. To facilitate this effort, members of the existing regional work groups and interested partners were convened to form the Agricultural Stewardship Scope Definition Joint Subcommittee (Subcommittee). Members of the Subcommittee are guided by a charter that identified its key deliverables:

- A description of the major agricultural challenges, categorized into priority groups, that the 2012 CVFPP should address. Additional details about the specific existing conditions and future challenges related to agricultural stewardship are being developed and captured by the Regional Conditions Work Groups.

- A description of major opportunities that the 2012 CVFPP should consider for addressing the major challenges, including recommendations for improving upon past efforts and coordinating with current efforts.

- A list of the key principles for guiding the development, integration, and implementation of agricultural stewardship features in the 2010 CVFPP and considered in future plan revisions.

- A list of the major agricultural goals that should be included in the 2012 CVFPP and considered in future plan revisions.

- A description of approaches or measures to evaluate the 2012 CVFPP's effective integration and implementation of agricultural stewardship elements.

1.1.1 Definition of Agricultural Stewardship

A public and private commitment to manage and preserve the resources and support the conditions necessary for a robust and sustainable agricultural industry in California.

1.2 Process and Content

"Important Considerations for the Central Valley Flood Protection Plan Related to Sacramento-San Joaquin Valley Agriculture" records the Subcommittee's work efforts and presents the deliverables identified in Section 1.1. It is written to reflect the panoply of views and opinions of Subcommittee members. Content was drawn from prior efforts of the Sacramento Valley Flood Control Action Workgroup (SVFCAW), three full-day Subcommittee meetings, and multiple communications with Subcommittee members.

The paper serves as the vehicle for providing the Subcommittee's input to development of the RCR which is the first major milestone report in development of the 2012 CVFPP. This input will not become a separate section in the RCR; rather, it has been incorporated in sections where appropriate, similar to the incorporation of input from other topic and regional work groups. The agricultural stewardship considerations raised here will be considered throughout the CVFPP planning process.

This paper will remain a draft document until the 2012 CVFPP is finalized, as will all interim CVFPP documents. Further development of the CVFPP may yield additional improvement to the results documented here.

1.3 Subcommittee Participants and Support

The Agricultural Stewardship Scope Definition Joint Subcommittee consists of volunteer members, DWR representatives, and supporting staff.

1.3.1 Volunteer Members

The Subcommittee's members and observers[1] represent a geographically broad group with a diverse set of perspectives and interests.

- Ray Anderson, Retired Farmer
- Lewis Bair, Reclamation District 108*

[1] Asterisks ("*") denote Subcommittee meeting observers.

- Julie D. Berry, Madera Farm Bureau
- Ryan P. Bonea, Sutter County Resource Conservation District and Yuba County Resource Conservation District
- Todd William Bruce, Dutra Group and Solano/Yolo Air Resources Control Board
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- Gena Lasko, California Department of Fish and Game
- Mari Martin, Resource Management Coalition
- Karen Medders, North Delta CARES
- Diana Westmoreland Pedrozo, California Women for Agriculture, East San Joaquin Water Quality Coalition, San Joaquin Valley

Clean Energy organization, Merced Council for the Central Valley Farmland Trust

- David Pegos, California Department of Food and Agriculture
- David Richter, Sutter Basin grower
- Max Sakato, Reclamation District 1500
- Pia Sevelius, Butte County Resource Conservation District
- Susan Sutton, SAS Strategies, rice farmer
- Susan Tatayon, The Nature Conservancy
- William Taylor, U.S. Department of the Interior, Bureau of Reclamation
- Anthony Van Ruiten, Van Ruiten Brothers Farm
- William Wallace, landowner

1.3.2 DWR Representatives

- Ken Kirby, Kirby Consulting, FloodSAFE California (FloodSAFE) Executive Advisor
- Dan McManus, Northern Region Office
- Michele Ng, Central Valley Flood Planning Office
- Joe Bartlett, Central Valley Flood Planning Office
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1.3.3 Supporting Staff

- Roger Putty, MWH Americas, Inc. (MWH)
- Craig Moyle, MWH
- Erica Bishop, MWH
- Alexandra Tollette, MWH

2.0 An Overview of California's Agricultural Economy

For many outside California's agricultural community, the industry's most tangible benefits are those plucked from meat counters, produce aisles, and farmers' markets, but agriculture also provides additional far-reaching benefits locally, regionally, nationally, and globally. From its enormous contributions to the State's economy to its role in sustaining our national security, it is an industry that forms the foundation of California's prominence both nationally and on the world stage.

California has been the nation's top agricultural state in cash receipts every year since 1948. In 2007, although California's 75,000 farms represented less than 4 percent of the nation's total farm acreage, they accounted for almost 13 percent, or $36.6 billion, of the total U.S. farm receipts (CDFA, 2009a; UC AIC, 2009). California's agricultural production includes more than 400 different commodities. According to the California Department of Food and Agriculture (CDFA), farm and ranch production in the State generates $100 billion in related economic activity (CDFA, 2009a).

2.1 Sacramento-San Joaquin Valley Agriculture

Agriculture is a powerhouse for California's economy, and Central Valley agriculture is the fuel driving it. According to the U.S. Bureau of Economic Analysis, California's economy in 2008 was worth more than $1.8 trillion, ranking as the tenth largest in the world (BEA, 2009). Central Valley farms and ranches make important and consistent contributions to this economic strength. The value of all crops and commodities produced by the counties within and connected to the CVFPP Systemwide Planning Area (SPA) (Figure 2-1) represents almost half of the State's total agricultural production value[2] of nearly $44 billion. The 18 counties within and connected to the SPA are some of the most productive in California, representing 40 percent of total agricultural production (CDFA, 2009b) (Table 2-1).

[2] Agricultural production value is the market value of all crops/commodities produced, regardless of whether they were sold.

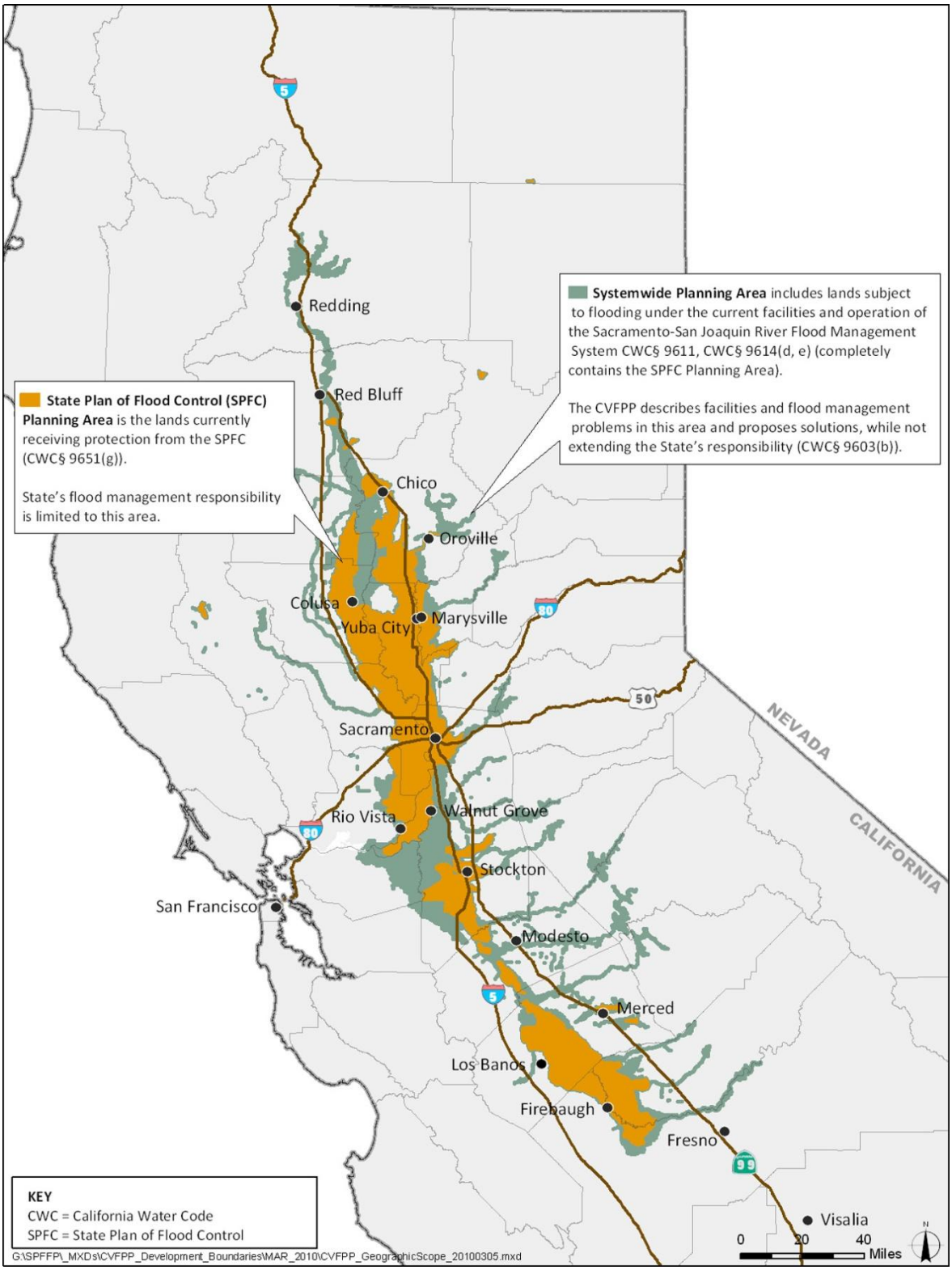

Figure 2-1. CVFPP Planning Areas

Table 2-1. Total Agricultural Production Values by California County

	Total Value of Production (Millions)
County	**2007**
Fresno	$5,345
Merced	$3,001
Stanislaus	$2,412
San Joaquin	$2,005
Madera	$1,219
Butte	$490
Colusa	$484
Glenn	$493
Yolo	$453
Sutter	$377
Sacramento	$364
Solano	$268
Tehama	$190
Yuba	$148
Shasta	$98
Contra Costa	$76
Placer	$52
Alameda	$42
Total for SPA Counties	**$17,520**
Total for State	**$43,950**
State Total Produced in SPA	**40 percent**

Source: CDFA, 2009b

Among the top 10 producing counties in the State, five (Fresno, Madera, Merced, Stanislaus, San Joaquin) are contiguous with the SPA and account for 32 percent of total agricultural value production for the State (CDFA, 2009c).

The leading commodities in the SPA, in terms of the total value of agricultural production, are described in Table 2-2.

Table 2-2. Gross Production Values by Commodity

	Total Production Value SPA[1]	Total Production Value Statewide[1]
Commodity[2]	**2007**	**2007**
Dairy (1)	$3,205	$7,303
Almonds (5)	$2,123	$2,639
Grapes, All (2)	$1,080	$4,005
Cattle and Calves (4)	$1,027	$2,787
Tomatoes, All (9)	$999	$1,250
Rice (15)	$656	$665
Walnuts (11)	$603	$825
Chickens, All (12)	$573	$1,019
Hay (7)	$399	$1,477
Peaches (19)	$329	$540

Source: CDFA, 2009a

Note:
[1] In millions
[2] Parentheses indicate Statewide ranking of crop in 2007

While this report speaks broadly of "Central Valley" agricultural production, the SPA is by no means homogenous; the Sacramento and San Joaquin valleys, and the Delta, each have their own characteristics that have shaped, or been shaped by, the types of crops and commodities they generate.

2.1.1 Sacramento Valley

The Sacramento Valley contains approximately 1.85 million acres of irrigated agricultural land. Crop statistics show that irrigated agricultural acreage in the region peaked during the 1980s and has since declined through conversion to urban and managed wetland development (DWR, 2009).[3] Agriculture is the region's largest industry, contributing a wide variety of crops including rice, grain, tomatoes, field crops, fruits, and nuts (DWR, 2009).

Different soil types in the valley floor help contribute to the variety of crops grown and to opportunities for groundwater recharge on agricultural lands, which vary dramatically throughout the region. Fifty-two percent of the Sacramento Valley area is classified as having clayey soils with a high

[3] The type of conversion irrigated farmland has undergone during this period varies by county and region. For instance, approximately 13 percent of irrigated lands in Sacramento County have been converted to non-agricultural uses since 1988, but conversion to urban/built-up land outweighs conversion to other lands, including managed wetlands, at a ratio of five-to-one. In Sutter County, however, about 6 percent of irrigated farmland has been converted since 1988, but the ratio of conversion to urban/built-up lands versus other lands is approximately one-to-three (DOC, 2009).

water table or typified by a shallow impervious soil layer with very slow infiltration rates. Approximately 25 percent of the area exhibits deep and moderately deep, moderately well-drained and well-drained soils with moderately coarse texture, and moderate infiltration rates. The remaining 20 percent of the area is classified as having moderately fine or fine textures, layers that impede downward movement of water and slow infiltration rates (NRCS, 2001).

2.1.2 San Joaquin Valley

The San Joaquin Valley contains roughly 2 million acres of irrigated cropland. The region has a high diversity of commodities with the top five consisting of milk, almonds, poultry, cattle, and grapes. In 2007, Fresno remained the nation's leading county for agricultural production at $5.35 billion (DWR, 2009).

The diversity of crops grown in the San Joaquin Valley is influenced by varied surface soils compositions. Soil type distribution also affects groundwater recharge opportunities, which vary dramatically in this region. Forty-seven percent of the San Joaquin Valley area is classified as having clayey soils with a high water table or typified by a shallow impervious soil layer with very slow infiltration rates. Another 34 percent of the area is classified as having moderately fine or fine textures, layers that impede downward movement of water and slow infiltration rates. Less than 20 percent of the area exhibits deep and moderately deep, moderately well-drained and well-drained soils with moderately coarse texture, and moderate infiltration rates. A small percentage – two percent – of this area is covered with soils that are deep, well-drained to excessively drained sands and gravels, with high infiltration rates (NRCS, 2001).

2.1.3 Delta

The Delta is dominated by highly productive agricultural land, with approximately 476,000 acres of irrigated agricultural land. The principal crops grown in the Delta are corn, alfalfa, tomatoes and grapes; much of the land is also devoted to pasture (DWR, 2009).

As with the rest of the Valley, crops patterns in the Delta are governed by predominant soil types. The water tables in the Delta are currently at or near the ground surface in most areas, therefore this region has limited groundwater recharge opportunities. Forty-seven percent of the soils in the Delta area are classified as having moderately fine or fine textures, layers that impede downward movement of water and slow infiltration rates. Approximately 40 percent of the area is classified as having clay soils with a high water table or typified by a shallow impervious soil layer with very slow infiltration rates for groundwater recharge. The remaining 10 percent

exhibits deep and moderately deep, moderately well-drained and well-drained soils with moderately coarse texture, and moderate infiltration rates (NRCS, 2001).

2.2 Contributions to Domestic and Global Food Supplies

California agriculture provides and supports reliable, affordable food and fiber production both domestically and on a global scale.

California produces about half of U.S.-grown fruits, nuts, and vegetables, and was the nation's leading dairy producer in 2007, producing 22 percent of the U.S. milk supply (CDFA, 2009a). Additionally, the Golden State is the nation's sole producers (supplying 99 percent or more) of a large number of specialty crops, including almonds, artichokes, clingstone peaches, dried plums, figs, olives, persimmons, pomegranates, raisins, Ladino clover seed, sweet rice, and walnuts (CDFA, 2009a). Seven of these crops are major crops in counties within the SPA.

In 2007, California exported an estimated $10.9 billion worth of agricultural products to more than 80 percent of the world—more than 156 countries worldwide (CDFA, 2009a). Sixteen of California's top 20 export crops are major commodities for counties within the SPA (CDFA, 2009b).

2.3 Farm Employment and Socioeconomics

More than 700,000 jobs in California are directly or indirectly supported by agriculture (UC AIC, 2009). The dominance of agriculture as a major land use and economic activity in the Central Valley is demonstrated by employment patterns in the region relative to elsewhere in the State. Vegetables, fruits, and tree nuts accounted for 1.5 percent of State employment and 1 percent of labor income. Similarly, the beef and dairy industry provides $1.8 billion in labor income and 105,000 jobs, or 0.5 percent of total employment in the State (UC AIC, 2009). The Central Valley agricultural processing industry accounts for almost eight percent of the regional employment and seven percent of the regional labor income (UC AIC, 2009).

2.4 Sacramento-San Joaquin Valley Land Values

In general, values for cropland and rangeland throughout the Central Valley depend on a diverse set of characteristics such as water supply source and

reliability, presence of a crop (e.g., vineyard or orchard), climate, and soil composition. These factors contribute to the dramatic range in per-acre costs shown in Table 2-3. As such, these land values should be viewed as representative examples of the industry's dynamic business structure that employs tens of thousands of people, produces billions in raw products, and supports a multi-billion dollar food production industry.

2.4.1 Sacramento Valley

While the mosaic of Sacramento and San Joaquin valleys' agricultural crop types share some similarities, the Sacramento Valley's characteristics make it uniquely suited to growing certain commodities, such as rice, that are not commercially suitable for the more arid San Joaquin Valley. Ranges of average per-acre land values by type of use for the Sacramento Valley are shown in Table 2-3 (Cal ASFMRA, 2009).

Land in Sacramento, Solano, Placer, and Yolo counties maintains both the highest value and the greatest range of possible values in the Sacramento Valley (Cal ASFMRA, 2009).

Table 2-3. Range of Average Agricultural Land Values in the Sacramento Valley (2008)

	Cropland (per Acre)	Rangeland (per Thousand Acres)
Colusa, Butte, Glenn, and Tehama	$3,000 - $8,000	$500 - $1,000
Placer, Sacramento, Solano, and Yolo	$3,000 - $12,500	$700 - $5,450
Sutter and Yuba	$3,500 - $7,000	
Shasta (and Lassen, Modoc and Siskiyou)	$2,000 - $5,000	$175 - $950

Source: Cal ASFMRA, 2009

2.4.2 San Joaquin Valley

More so than in the Sacramento Valley, in many areas of the San Joaquin Valley agricultural land values vary widely due to factors such as water supply, climate, microclimate, and soil type. Locations along the rim of the valley floor typically support high-value, permanent crops (trees, nuts, and vines) and, therefore, command higher land values. Those on the arid valley floor typically support seasonal row and forage crops (alfalfa, corn, melons, tomatoes, cotton, and grains). Grape and tree nut crops, however, are replacing some seasonal crops due to market demands and water supply availability. In the permanent crop-rich Merced Irrigation District service area, for example, typical property values range from $18,000 to $29,000 per acre. In comparison, portions of Merced County typified by row and

forage crops and served by federal water supplies have a per-acre value range of $3,500 to $5,500 (Table 2-4) (Cal ASFMRA, 2009).

Table 2-4. Range of Average Agricultural Land Values in the San Joaquin Valley (2008)

	Cropland (per Acre)			Rangeland (per Thousand Acres)		
Fresno	$2,500	-	$12,000	$125	-	$3,000
Madera	$3,500	-	$8,000	$650	-	$2,750
Merced	$3,500	-	$20,000	$500	-	$1,600
San Joaquin	$8,000	-	$15,000	$4,000	-	$6,000
Stanislaus	$9,000	-	$29,000	$1,000	-	$5,000

Source: CalASFMRA, 2009

2.5 Federal Crop Insurance and Loans

2.5.1 Crop Insurance

As with all countries, the U.S. views domestic food production as a contributor to national security. To assist public and private interests in the protection of the agricultural sector, the federal government passed the Federal Crop Insurance Act (amended through Public Law 111-80, October 21, 2009). Under this law, agricultural operations are eligible to purchase federal crop insurance through cooperative agreements established between the Federal Crop Insurance Corporation (FCIC) and an insurance company. The U.S. Department of Agriculture's (USDA) Risk Management Agency (RMA) acts on behalf of FCIC to administer federal crop insurance programs. Under this program, a portion of the insurance premium, as well as the administrative and operating expenses of the insurance carrier, are subsidized by the federal government. The FCIC also reinsures the insurance carriers by absorbing some of the losses of the program when indemnities exceed total premiums. Though administered by the federal government, the crop insurance program involves many groups, including agricultural lenders, private insurance companies, retail insurance agents, and private reinsurance companies (American AgCredit, 2009).

Crop insurance is available for all crops that are deemed suitable for an area by the RMA. Crop suitability depends on many factors, including soil types, flood risk, climate and availability of coverage for a given crop in specific areas, The RMA may identify an area as uninsurable if risks to crop production are too high, but few areas are considered completely uninsurable by the RMA. An example of an uninsurable area are portions of the Yolo Bypass where the farmer's intent is to grow certain crops such as wheat or barley in the fall or winter when it is most susceptible to

flooding and crop loss. Federal Emergency Management Agency (FEMA) flood maps are used to determine the flood risk for a given area but many other risk factors are also considered. Risk Areas are identified by the RMA and include areas where suitable crops can be grown, and are therefore insurable, but the risk of crop loss may be slightly higher. Premiums are higher in Risk Areas (RMA, 2009).

There are many coverage levels (from 50 percent to 85 percent) and policy combinations available to agricultural operations. The majority of policies in California are Multi-Peril Crop Insurance (MPCI). These policies cover all natural causes including drought, fire, excessive moisture, freeze, and in some cases, disease damage caused to crops. There are options that combine yield protection and price protection to protect farmers against potential loss in revenue, whether due to low yields or changes in market price. Catastrophic Coverage (CAT), available for all insurable crops, and the Noninsured Crop Disaster Assistance Program (NAP) are also available in many areas (RMA, 2009). Named peril and all-risk insurance is available in certain areas from private insurance companies. A named peril policy covers specific events, such as floods, that are named in the policy. Premiums depend on location and risk of the specific events named in the policy. An all-risk policy covers damages caused by any type of disaster with the exception of those specifically excluded in the policy. Floods and earthquakes are two events that are typically excluded, but coverage for these types of disasters can be added to the policy for an additional fee. The National Flood Insurance Program underwrites coverage for flooding, making it more easily available to producers (RCIS, 2009).

Premiums for MPCI policies are determined by crop type, county, and level of coverage chosen by the participant. Premiums for CAT and NAP programs are paid wholly by the federal government but the producer is responsible for an administrative fee. Premium subsidies from the federal government are available for crop insurance policies and are determined by the coverage level selected by a participant. Exposure to a greater flood risk (or any other risk) does not preclude farmers from obtaining crop insurance for suitable crops but can affect the level of coverage they choose for a crop and subsequently, the premium subsidy amount they receive. Historically, the cost of insuring suitable crops has not been prohibitive (RMA, 2009). Although, crop insurance may be helpful in certain situations, it should not be relied upon as a panacea for disaster recovery. Crop insurance program availability can change yearly and may become unavailable for certain crops in areas that previously relied upon it. Basic information regarding FCIC crop insurance use within the SPA is detailed in Table 2-5.

Table 2-5. FCIC Crop Insurance Usage in the SPA

County	Total Insured Area (acres)	Total Policies Sold	Total County Area (acres)*	Percent of Total County Area Insured by FCIC (acres)*
Alameda	1,732	20	525,335	0.3
Butte	145,437	892	1,073,258	13.6
Colusa	170,430	933	740,380	23.0
Contra Costa	9,950	54	514,016	1.9
Fresno	795,573	7,146	3,846,394	20.7
Glenn	109,923	675	849,129	12.9
Madera	166,728	1,251	1,377,570	12.1
Merced	193,428	1,289	1,265,626	15.3
Placer	11,416	68	960,035	1.2
Sacramento	51,397	450	636,075	8.1
San Joaquin	240,000	2,555	912,593	26.3
Shasta	5,888	25	2,465,223	0.2
Solano	54,493	426	582,367	9.4
Stanislaus	108,829	1,223	970,168	11.2
Sutter	161,685	1,315	389,308	41.5
Tehama	25,128	259	1,892,918	1.3
Yolo	126,700	600	653,447	19.4
Yuba	34,204	271	412,016	8.3

Note:
* Total county area includes urban areas and other areas not currently in agricultural production.

2.5.2 Agricultural Loans

Similarly to other businesses, agricultural producers often require loans to purchase equipment, property, seed, or other materials to initiate or maintain a viable agricultural operation. Analogous to crop insurance, agricultural loans given for crop production are based on the suitability of crops for a given area based on soil types, flood risk, climate and availability of funds for a given crop in specific areas. Loans available to the agricultural industry are available from many sources and are discussed in this section.

Farm Credit institutions are chartered by the federal government and must operate within limits established by the Farm Credit Act. Congress established the Farm Credit System (FCS) as a government-sponsored enterprise when it enacted the Federal Farm Loan Act in 1916. Current authority is in the Farm Credit Act of 1971 (Public Law 92-181, as amended; 12 U.S. Code 1200 et seq.). The FCS is a nationwide network of borrower-owned lending institutions and specialized service organizations. The FCS provides more than $160 billion in loans, leases, and related services to farmers, ranchers, rural homeowners, aquatic producers, timber harvesters, agribusinesses, and agricultural and rural utility cooperatives and is the largest agricultural lender in the United States. The FCS provides more than one-third of the credit extended to rural interests (FCA, 2009). In addition to providing agricultural property loans, FCS also loans funds for the purchase of rural homes; to finance rural communication, energy, and water infrastructures; and to support agricultural exports. Many risk factors are considered during the FCS loan process, including flood risk. Flood risk is determined using FEMA flood maps. In the event of disasters, including floods, the FCS has many options that include debt restructuring, loan re-amortization, principal deferment, and other steps that can help a producer through the immediate situation and loss of revenue and property and provide time for recovery. In most cases, a minimum of CAT insurance coverage is necessary to qualify for loans related to crop production. The Farm Credit Administration (FCA) is the independent federal regulatory agency that oversees the FCS (FCA, 2009).

The Farm Credit Act of 1933 authorized farmers to organize Production Credit Associations (PCA) to deliver short- and intermediate-term loans to agricultural operations, and to rural residents for housing. A PCA also loans funds for basic processing and marketing activities, and to agricultural-related businesses. A PCA obtains funds from an FCS bank to lend to its members. All present-day PCAs are now subsidiaries of Agricultural Credit Associations (ACA). An ACA is the result of the merger of a Federal Land Bank Association or a Federal Land Credit Association and a Production Credit Association and has the combined authority of the two institutions. An ACA is an institution of the FCS and obtains funds from a Farm Credit Bank or an Agricultural Credit Bank to provide direct lending of short-, intermediate-, and long-term loans to agricultural producers, rural homeowners, and some farm-related businesses.

Private lenders also extend credit to agricultural operations for structures, operations, equipment, and materials. Similar to federally administered loans, private loans are based on crop suitability and are subject to detailed flood risk evaluations derived from FEMA flood maps. FEMA flood maps are used to determine the flood risk for an area, how this risk affects

average yield, and the subsequent ability of a farmer to repay a loan. Loans for structures must be accompanied by appropriate flood insurance for the property. Loans for the planting of most suitable crops will be approved. However, as with federal crop insurance eligibility, some seasonal production loans may be affected in areas based on excessive flood risk and the subsequent potential for default by the borrower.

The Farm Service Agency (FSA) of the USDA is responsible for approximately three percent of loans given to farmers in the Central Valley. Most FSA loans are for borrowers that were unable to secure private agricultural loans. As the FSA is a federal program and is subject to federal interest rate requirements and regulations, the agency cannot apply a higher interest rate for loans in areas of a higher flood risk, in the way that traditional loan risk is managed. A loan to fund the construction of a structure, such as a barn, would not be given if the location was within a designated flood zone. However, loans to fund the planting of suitable crops can be obtained from the FSA (FSA, 2009).

3.0 Multifunctional Values and Benefits of Agriculture

In addition to the socioeconomic benefits associated with a robust agricultural industry, the day-to-day operations of many farms and ranches also provide direct and indirect benefits to multiple interests at the local and regional scale. Traditional economic methods for analyzing benefit-cost ratios of agricultural-related projects often do not explicitly consider these broader benefits and may undervalue the overall benefits associated with agricultural production. Economists and planners often struggle with how best to isolate and quantify the full range and extent of agriculture-related benefits and services. This section describes some of the direct and indirect benefits Subcommittee members associate with agricultural operations.

- **Biodiversity** – The agricultural community is an active proponent of biodiversity in the production of food and fiber. Farms and ranches support high levels of genetic diversity by using integrated pest management, creation of vegetative buffer zones and habitat for wildlife, and active control of nonnative plant and pest species.

- **Carbon Sequestration and/or Greenhouse Gas Reduction**[4] – Farms and ranches offer a number of opportunities for reducing the levels of greenhouse gases in the atmosphere, such as:

  - Conservation or riparian buffers: these grasses or trees planted along streams and croplands prevent soil erosion and nutrient runoff into waterways and increase carbon storage through sequestration.

  - Conservation tillage on croplands: any tillage and planting system in which 30 percent or more of the crop residue remains on the soil after planting is less disruptive to the soil, and therefore allows soil carbon to accumulate. This increases carbon storage through enhanced soil sequestration, may reduce energy-related carbon dioxide emissions from farm equipment, and could affect nitrous oxide positively or negatively.

  - Grazing land management: adoption of grazing practices that produce beef and dairy products that lead to net greenhouse gas

[4] U.S. Environmental Protection Agency Carbon Sequestration in Agriculture and Forestry (http://www.epa.gov/sequestration/ag.html)

reductions, such as rotational grazing, increases carbon storage through enhanced soil sequestration and may affect emissions of methane and nitrous oxide.

- Biofuel substitution: replacement of fossil fuels with biomass, such as agricultural and forestry wastes or crops and trees grown for bioenergy purposes, in the production of energy or energy-intensive products like steel, substitutes carbon for fossil fuel and can also affect soil nitrous oxide emissions.

- **Cultural and Historical Significance –** Agriculture is unmatched among California's industries in its deep and enduring connection to California's, land, people, and cultural identity.

- **Fish Protection (Screens)** – The agricultural community reduces negative impacts on fish populations through the construction and maintenance of fish screens at diversion projects.

- **Flood Buffers** – Numerous crops cultivated by agriculture provide a hydraulic buffer to urban areas by slowing water runoff and providing temporary storage. Crops suitable for temporary flooding include alfalfa, wheat, and grapes.

- **Green/Open Space** – Areas of protected or conserved land or water on which development is indefinitely set aside.

- **Groundwater Recharge** –Spreading of floodwaters on land with appropriate soil and groundwater conditions can provide groundwater recharge benefits and may help mitigate land subsidence.

- **Job Retention –** Farms and ranches provide a sustained source of employment for hundreds of thousands of Californians living in the Sacramento and San Joaquin valleys.

- **Land Stewardship** – Agriculture ensures the long-term beneficial use of the soil for the cost-effective production of food and fiber.

- **Levee Maintenance and Funding** – The vast majority of the 1,600 miles of levees within the State and federal flood management system are often maintained by levee or reclamation districts funded and supported by local economies, many driven by agriculture.

- **National Security** – The diversity and abundance of agricultural production in the Central Valley and elsewhere allows the nation to be

self-sufficient in meeting food and fiber needs regardless of the season and changes in global affairs.

- **Recreation** – Numerous farming operations provide recreational opportunities, including waterfowl and upland game hunting, as well as bird watching and other passive activities.

- **Tax Revenue** – While farm receipts represent just one percent of California's $1.8 trillion economy, its raw products are converted to billions of dollars in finished products, and thousands of tax-paying jobs.

- **Water Efficiency** – From micro-irrigation to tail water recovery systems, agriculture implements modern water efficiency methods for public and environmental benefits.

- **Water Quality** – Through the Irrigated Lands Regulatory Program, working with watershed coalitions to help monitor runoff, and recycling brackish water, farmers employ a wide range of tools to help improve or maintain the quality of the water they use for irrigation. Additionally, many crops, such as alfalfa, capture sediment from irrigation waters through the irrigation process and actually mitigate for soil erosion.

- **Watershed/Channel Management** – Flood management activities for many agricultural areas, including maintenance of levees by rural communities, also provide protection for habitat areas, including managed wetlands, National Wildlife Refuges, State Wildlife Areas, and mitigation lands.

- **Wildlife Habitat** – The Central Valley is the spine of the Pacific Flyway, with harvested and/or flooded forage crops, such as rice and alfalfa, providing feed and areas to rest for millions of migratory waterfowl each year. Farms also provide protection for habitat areas, including managed wetlands, National Wildlife Refuges, State Wildlife Areas, and mitigation lands.

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4.0 The Role of Flood Management in Sustaining Agriculture

Historically, Sacramento-San Joaquin Valley levees were constructed without regard to the type of land use being protected. Communities and agricultural lands both received protection from levees that were maintained to successfully pass flows from the largest storms on record in the valley. In subsequent years, two major types of flood management system improvements occurred. Discrete projects were constructed to address localized levee performance issues. As California's population increased and once-rural communities grew into densely inhabited cities, basin-wide initiatives began that were focused on improving performance in the portions of the system that protect urban development. Thus, many in the agricultural industry are concerned that improvements to urban flood protection have resulted in "tiered" flood protection levels, and that they will be asked to sacrifice their lands and livelihoods in the process of further improvements.

Central Valley agriculture and flood management are inextricably linked in a relationship that extends as far back as California's statehood and will persist because farms and ranches remain foundations of the State's economy. Local landowners planted the seeds of today's flood protection system by building levees to help direct flows and reduce damages to farms and communities caused by frequent flooding. The future of agricultural viability in the Central Valley is dependent upon the State's ability to plan a resilient flood management system that gives equal consideration to urban cities and their rural neighbors.

4.1 Primary Problems and Opportunities, and Goals, Related to Integrated Flood Management and Agriculture

The CVFPP focuses, primarily, on conditions, challenges, and potential improvements within the SPA indicated in Figure 2-1. The following sections provide recommendations from the Subcommittee to DWR for how to ensure the CVFPP adequately addresses integrated flood management needs for portions of the SPA that include agricultural lands and rural communities.

4.1.1 Agriculturally Focused Problems and Opportunities

Members of the agricultural community and participants in the Subcommittee identified problems related to the current flood management practices in the Central Valley and provided suggestions for improvement to the existing flood management system. These perspectives represent concerns related to flood management in areas where Subcommittee members live and work. A listing of the primary problems and suggested improvements are provided below. Many of these problems are also described in the CVFPP Regional Conditions Report.

- **Levee Performance Dichotomy** – Over the past few decades, the level of protection has changed in parts of the system, particularly as communities have urbanized and made incremental levee improvements. Also, our collective understanding of levee failure mechanisms has improved, and the system hydrology and hydraulics have been updated. As a result, not all areas throughout the system receive the same level of flood protection. While the differing levels of protection will likely continue, a portion of the flood management system should not rely on failures in another area for their flood protection.

- **Financial Risk Exposure –** Farmers' ability to borrow capital and obtain adequate insurance is connected to the perceived risk of flooding for areas being used for agriculture. Changes in the assumed level of protection in the flood management system can have uncertain effects on lending and insurance programs.

- **Post-Flood Economic Recovery** – Existing post-flood recovery plans and programs do not adequately address agricultural economic recovery and related longer term effects on rural economies. When floods occur in agricultural areas, resulting damages to crops and infrastructure can hinder rural communities' economic growth and stability long after waters have receded.

- **Habitat and Ecosystem Priority** – Depending upon the magnitude and extent, ecosystem enhancements within flood corridors have the potential to negatively impact the flood management system and thus rural communities and existing agricultural land uses and benefits.

- **Flood Risks from Changed System Conditions** – In some areas, the current flood protection system design[5] no longer provides the expected level of protection for agricultural land uses due to changes within

[5] As described in the *Flood Control System Status Report* forthcoming from DWR.

designated floodways and bypasses. Vegetation growth in the channel and the accumulation of snags, sediment, and debris restrict channel carrying capacities. Levee maintenance and structural integrity may be compromised by vegetation growth, as well as by land use encroachments up to the toe of the levee. The hydraulic carrying capacities of dedicated bypass channels serving multiple functions may be impeded due to ecosystem habitat that has not been maintained to facilitate rapid evacuation of flood flows and the vegetation may now be protected under State and federal environmental regulations.

- **Inhibitions to Operation and Maintenance –** It is difficult to adequately maintain levees and channels in agricultural and rural areas in keeping with the authorized operation and maintenance manuals due to permitting and mitigation requirements and/or restrictions; vegetation growth, which hides problems and restricts access; lack of sustainable funding for proactive maintenance; and inconsistent or conflicting federal, State, and local maintenance standards, practices, and implementation. Finally the funding sources for maintaining levees and channels are unstable, rely on narrowly focused cost-benefit analyses of agricultural lands, and are often expended chiefly on the studies and environmental compliance activities necessary to initiate any maintenance.

4.1.2 Agriculturally Focused Goals

Managing the flood threat to human life, homes, public and private property, and critical infrastructure can be achieved through structural and nonstructural projects and promulgation of regulations on topics such as flood recovery, insurance, flood hazard zones, and planned development. Continuation of the existing risk-reward system has provided urban areas benefits to the greatest extent; however, a modified risk-reward system could be formulated to enable investment in rural areas as part of a systemwide approach. Below is a list of the primary goals identified by the agricultural subcommittee to be considered during development of the CVFPP.

- **Manage Flood Protection Performance Systemwide** – Evaluate the performance of levees and associated flood management infrastructure systemwide and improve as needed to provide appropriate levels of flood protection for the agricultural and other land uses at risk.

- **Improve Flood Protection and Flood Recovery** – Through development of tiered design standards that recognize the difference between urban, rural, and agricultural levees, reduce adverse economic effects to agricultural and rural communities that result from

deficiencies in the existing flood protection system and improve ability of communities and agricultural areas to recover from floods when they occur.

4.2 Potential Key Principles for Guiding the Development, Integration, and Implementation of Agricultural Stewardship Features of the CVFPP

The following are key principles the committee feels are important for development of a Central Valley Flood Protection Plan compatible with California agricultural resources and rural communities:

- Provide greater certainty and stability in flood operations and water supply reliability.
- Allow existing rural communities and agricultural areas to grow in a manner sufficient to sustain their property values and a vibrant economy.
- Avoid or minimize use of eminent domain as associated with the adopted CVFPP. If eminent domain powers in connection with flood protection are used, they shall comply with existing law.
- Implement (plan, design, and construct) flood protection improvements through partnerships with local agencies.
- Accurately communicate flood risk.
- Avoid jeopardizing farmers' abilities to secure loans for land purchase, operations, and capital expenses.
- Avoid requirements that would limit the availability of federal program benefits to farmers and ranchers.
- Maintain functionality of the current flood protection facilities systemwide while making long-term improvements.
- Provide balanced/equitable funding for concurrent improvement of urban and rural flood protection systems.
- Recognize and foster the conditions necessary for Central Valley agriculture to remain a driving force of California's economy and its tax base for public, local and state programs and benefits.

- Support sustainable farm operation and production.
- Maintain the Central Valley's historically wide range of crop diversity and high level of production.
- Undertake ecosystem enhancement and protect critical ecosystems in ways that do not imperil sound flood management, public safety, and viability of existing agricultural land uses and benefits.
- Ensure Delta water management, habitat, and alternative conveyance proposals do not degrade the designed system performance.
- Ensure understanding of how flood system improvements may affect potential financing opportunities and the outcome of risk-based analysis used to determine crop insurance eligibility.
- Apply permit and approval processes appropriate for each project, with consideration for the entire flood system.
- Minimize project life-cycle costs, where possible.

4.3 Suggested Actions to Address Flood Management Problems in Relation to Agriculture

The following recommendations are for actions or steps that the Subcommittee believes could address or contribute to the resolution of rural and agricultural communities' flood management concerns as identified previously in this paper. The actions range from very project- or policy-specific to more general suggestions.

4.3.1 Public Safety and Welfare

- Review current flood emergency procedures for potential updates and improvements, and improve emergency communications capabilities throughout the system.
- Increase the intensity and frequency of channel and bank maintenance within the river and bypass system to ensure ability to pass design flow.
- Consider re-operation of reservoirs to further reduce peak flows.

- Improve the review process, frequency of inspection, and enforcement of encroachment permits and permit violations to ensure consistency with system objectives.

- Recognize the importance of and enforce proper vegetation and sediment management to the flood protection of areas adjacent to river and bypass channels, including agricultural and urban areas.

4.3.2 Funding

- Fair, equitable, and affordable funding mechanisms should be developed for rural areas to address the challenges tied to accepting or assuming comparatively lower levels of flood protection than urban and urbanizing areas. Reliable funding is essential for agricultural communities and areas to develop and implement flood management and recovery plans, store equipment, train community members in flood emergencies and fighting, and conduct levee maintenance and repairs.

- Post-flood recovery programs should be implemented that address, in a timely manner, how: levees will be repaired; dewatering will be conducted; and critical infrastructure will be restored. These programs should include methods to compensate property owners for losses to residences, crops, pumps, machinery, equipment, ancillary buildings, and support infrastructure, and also look at third-party impacts and losses. The programs should define local, State, and federal responsibilities and identify respective funding programs or sources.

- Benefit-cost ratios and other methods used by the USACE and other agencies to evaluate and establish the value of agricultural areas should be updated to capture the multipurpose benefits of agriculture and its associated landscapes to local, State, and national economies. It should be recognized that these benefits extend beyond land and crop values and contribute to the sustainability of entire regions.

- Consider implementation of a "subventions-like" program to assist rural and agricultural areas in levee rehabilitation projects, including through cost-sharing or other creative funding approaches.

- Funding for multi-benefit projects should recognize and adapt to the potential local sponsors' ability to pay.

4.3.3 State and Federal Legislation, Regulations, and Policy

- New flood zones should be designated for agricultural areas and rural communities that reflect their unique circumstances and characteristics. This requires coordination with local governments and the State, and an organized effort to educate decision makers on the ramification of small rural communities being mapped in the 100-year floodplain (i.e., FEMA programs). Ideally, the State would take the lead in advocating for these new zones.

- A State program should be established to share insurance costs, develop flood resilience measures, and comply with future building regulations for agricultural areas.

- Guidelines that balance habitat and ecosystem goals with that of agricultural preservation should be developed and adopted as a public policy commitment.

- Revise current vegetation management policy to coincide with current regulatory requirements and to be consistent across all regulatory agencies.

- Establish a programmatic approach to meet USACE Section 408 compliance requirements for site-specific projects.

- Modify or tier inspection criteria based on levee type (urban, rural, agricultural).

- Update operations and maintenance manuals for the State-federal flood protection system to reflect current laws, regulations, and policies, which must include consent with local maintaining agencies.

4.3.4 Sustainability

- Land, levee, and channel management plans for ecosystem enhancement areas must be prepared and adopted before implementation of the ecosystem projects. These plans should address funding and resources, public access issues, potential impacts to jobs, economic growth, adjacent lands, maintenance requirements in perpetuity, and safe harbor agreements.

- Programmatic environmental permits should be developed for levee improvement and maintenance operations that clearly define the mitigation requirements and provide for this function over future generations.

- Develop environmental compliance strategies that facilitate maintainers' ability to manage flood control projects to pass flood flows.

- Explore mitigation banking opportunities in response to flood maintenance activities and needs.

- Identify opportunities for the beneficial reuse of sediment, especially for flood control and levee improvement projects.

- Adherence to all flowage easements is imperative and funding to accomplish the required maintenance must be provided over future generations.

4.3.5 General Actions

- A comprehensive financial assistance and recovery plan for either pre-anticipated or unanticipated emergency flood events in an identified rural or agricultural flood prone area should be considered.

- Elements of a pre-identified flood relief area, such as transitory flood water storage areas, flowage easement areas, and agricultural conservation areas should be defined.

- Elements of a flood recovery plan should include emergency response, funding and compensation, plans for dewatering and infrastructure retrofits.

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5.0 Indicators of Success for the CVFPP

This section includes guides for developing content for the 2012 CVFPP to ensure that agricultural stewardship considerations are successfully integrated into the plan. Each topic work group has developed "measurements of success" that will function like a checklist to evaluate whether the CVFPP is "successful" in addressing their perspectives, concerns or interests.

5.1 Process Guide Checklist

The Subcommittee developed a process guide for use by the CVFPP Plan Development Team to help ensure that agricultural concerns are addressed throughout development of the 2012 CVFPP (see Table 5-1). The process guide checklist describes the tangible steps to be taken to ensure this occurs.

Table 5-1 Process Guide

Desired Action
Engage broad representation of agricultural stewardship advocates during each phase of the CVFPP development process.
Ensure that multidisciplinary teams are involved in identifying potential management actions, formulating solution sets, evaluating solutions sets, refining solution sets, and crafting recommendations for State action.
Conduct an equitable, objective level of analysis for agricultural stewardship objectives as compared to the other objectives.
Promote improved understanding of agriculture's objectives and desired actions being advocated by various interests in the CVFPP.

Key:
CVFPP = Central Valley Flood Protection Plan

5.2 Content Guide Checklist

The Subcommittee also developed a content guide checklist for use by the CVFPP Plan Development Team to help ensure that agricultural stewardship considerations are integrated successfully into the 2012 CVFPP (see Table 5-2). The guide lists potential elements of the plan that would address concerns of the agricultural community as previously noted

in this document. This checklist may be used to measure how well agricultural stewardship considerations were incorporated into the 2012 CVFPP.

Table 5-2. Content Guide

#	Key Element	Description of How Key Element Could be Integrated in the 2012 CVFPP
1	Include important considerations related to agriculture	Describe and address the problems, principles, and goals identified and described in this "Important Considerations" paper developed by the Agricultural Stewardship Scope Definition Joint Subcommittee.
2	Emphasize protection of life and property as the primary purpose of flood management facilities	Identify management actions that preserve the primary functions of bypasses and floodways to help protect life and property as critical components of a flood management system. Actions may also enhance these facilities' secondary benefits and uses, such as habitat and recreation, where compatible.
3	Focus on "getting better together"	Describe a systemwide approach, inclusive of applicable structural and nonstructural recommendations, that affords increased urban flood protection in combination with actions that enhance rural and/or agricultural communities' ability to manage their flood risk and recovery effectively.
4	Identify conditions restricting flood facility capacity	Provide a science-based characterization of flood facilities and a quantification of how their conditions (i.e. vegetation, snags, multiple uses, etc.) may adversely affect channel capacity and flood water flow.
5	Acknowledge flood system operation effects on rural economies	Recognition of the potential for relatively lower flood protection levels in rural and agricultural areas which could benefit urban residents at the detriment of rural communities' economic fitness and viability; and, identification of acceptable trade-offs, development of methods for determining the value of rural and agricultural areas, and identify possible methods of financial and/or nonfinancial compensation between urban and non-urban interests.
6	Address conflicted maintenance requirements	Identify and characterize differing vegetation management policies between agencies, and provide clear maintenance direction while these differences are reconciled in order to reduce maintenance delays and project lifecycle costs.
7	Acknowledge importance and intrinsic value of maintaining non-urban areas in the Central Valley	Document how rural communities and the industries they support, such as agriculture, are vital to the economy on many levels; these areas also hold intrinsic value and are worth preserving and protecting. Management actions should be developed that reflect this understanding.
8	Value and benefits of agriculture	Describe the value and multifunctional benefits provided by the agricultural industry for food and fiber, flood management, and the additional services described in this "Important Considerations" paper.

Key:
CVFPP = Central Valley Flood Protection Plan

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7.0 Acronyms and Abbreviations

ACA	Agricultural Credit Association
BEA	U.S. Department of Commerce, Bureau of Economic Analysis
Cal ASFMRA	California Chapter of the American Society of Farm Managers and Rural Appraisers
CAT	Catastrophic Coverage
CDFA	California Department of Food and Agriculture
CVFPP	Central Valley Flood Protection Plan
DWR	California Department of Water Resources
FCA	Farm Credit Administration
FCIC	Federal Crop Insurance Corporation
FCS	Farm Credit System
FEMA	Federal Emergency Management Agency
FloodSAFE	FloodSAFE California
FSA	Farm Service Agency
MPCI	Multi-Peril Crop Insurance
MWH	MWH Americas, Inc.
NAP	Noninsured Crop Disaster Assistance Program
NCRS	U.S. Department of Agriculture, Natural Resource Conservation Service
PCA	Production Credit Association
RCIS	Rural Community Insurance Services
RCR	Regional Conditions Report
RCS	Regional Conditions Summary
RMA	U.S. Department of Agriculture, Risk Management Agency
SPA	Systemwide Planning Area
Subcommittee	Agricultural Stewardship Scope Definition Joint Subcommittee
SVFCAW	Sacramento Valley Flood Control Action Workgroup
UC AIC	University of California Agricultural Issues Center

USDA.....U.S. Department of Agriculture

USACE .....U.S. Army Corps of Engineers

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STATE OF CALIFORNIA
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